



## Market Based Measures for Green House Gas Emissions Reduction in Maritime Transport

**Psaraftis, Harilaos N.**

*Publication date:*  
2019

*Document Version*  
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

*Citation (APA):*  
Psaraftis, H. N. (Author). (2019). Market Based Measures for Green House Gas Emissions Reduction in Maritime Transport. Sound/Visual production (digital)

---

### General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

# Market Based Measures for Green House Gas Emissions Reduction in Maritime Transport



Harilaos N. Psaraftis  
Professor  
Technical University of Denmark

$$P(i|V) = \frac{\partial \ln G(e^V)}{\partial V_i} \int_a^b \varepsilon \Theta^{\sqrt{17}} + \Omega \int \delta e^{i\pi} = \{2.7182818284\} \chi^2 \Sigma! >> \text{,}$$

# Main reference

- More than 10 years of research on ship emissions & logistics tradeoffs
- Involvement at the IMO, EU, etc

# Big news from the IMO: April 2018



INTERNATIONAL  
MARITIME  
ORGANIZATION

[English](#)
[Français](#)
[Español](#)

[Home](#)
[About IMO](#)
[Media Centre](#)
[Our Work](#)
[Publications](#)
[Knowledge Centre](#)

[Press Briefings](#)
[Archives](#)
[Meeting Summaries](#)
[Secretary-General](#)
[IMO Maritime Ambassador scheme](#)
[What's New](#)
[In Focus](#)
[IMO News Magazine](#)
[Multimedia](#)
[Attending IMO meetings](#)

IMO / English / Media Centre / Press Briefings / UN body adopts climate change strategy for shipping



**UN body adopts climate change strategy for shipping**

# “Initial IMO strategy”

## TARGETS:

- **Reduce annual GHG emissions**  
**by  $\geq 50\%$  by 2050** (vs 2008 levels)
- **Reduce annual CO<sub>2</sub> emissions per transport work** **by  $\geq 40\%$  by 2030**, pursuing efforts towards **70%** by 2050 (vs 2008 levels)
- **Q: How?**





# IMO, April 2019

International Maritime Organization aims to halve global emissions by 2050



▲ Extinction Rebellion activists at the International Maritime Organization in London as delegates arrive.  
Photograph: Ollie Millington/Getty Images




# IMO: the GHG track

## Subtrack I

- EEDI

Design Index



## Subtrack II

- MBMs

The **IMO Roadmap** (2016), leading to the **Initial IMO Strategy** (2018)

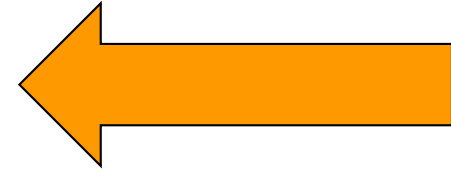
# IMO: the GHG track

## Subtrack I

- EEDI

## Subtrack II

- MBMs



The **IMO Roadmap** (2016), leading to the **Initial IMO Strategy** (2018)



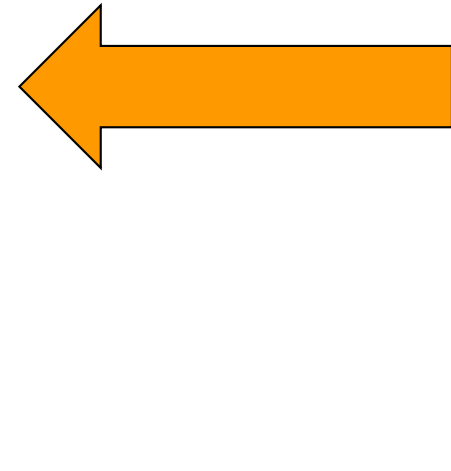
# IMO: the GHG track

## Subtrack I

- EEDI

## Subtrack II

- MBMs



The **IMO Roadmap** (2016), leading to the **Initial IMO Strategy** (2018)

# MBMs at the IMO: 2010-2013

- 11 MBM proposals at MEPC 60 (March 2010)
- Expert Group formed by IMO Sec. General
- 9 criteria for evaluation
- Feasibility study (300-page report)
- Work: May- August 2010
- Report presented at MEPC 61 (Sep. 2010)
- Various discussions since then

# How does an MBM work?

- It induces operators and investors to adopt measures that will reduce CO2 emissions
- These measures can be
  - **Operational** (short run)
  - **Technological** (long run)

# Example: bunker levy

## SHORT RUN

- Reduce ship speed  
hence GHG emissions

## LONG RUN

- Buy a ship that is more  
energy efficient hence  
reduce GHG emissions

# What else can an MBM do?

- Collect money to be used for various purposes (even to reduce GHG emissions)



# In-sector vs out-of-sector

## In-sector

- **Direct** reduction of emissions (eg, reduce speed due to a fuel tax)

## Out-of-sector

- **Indirect** reduction of emissions (eg, use the money to build a wind farm in New Zealand)



# MBM proposal groups

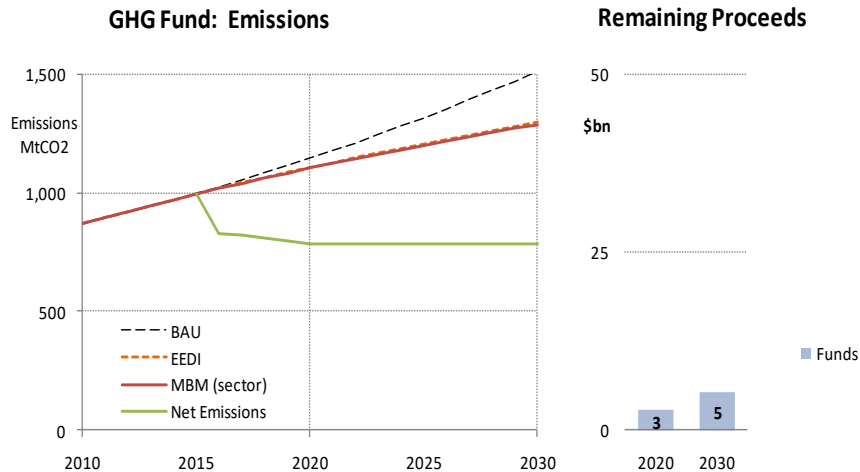
- International GHG Fund (Denmark et al) (LEVY)
- 4 distinct Emissions Trading Schemes (ETS) (Norway, UK, France, Germany)
- Various hybrids, based on EEDI (Japan, USA, WSC)
- Port-based (Jamaica)
- Rebate mechanism (IUCN)
- Bahamas proposal

# Emission reductions in 2030

## Modelled emission reductions across various scenarios

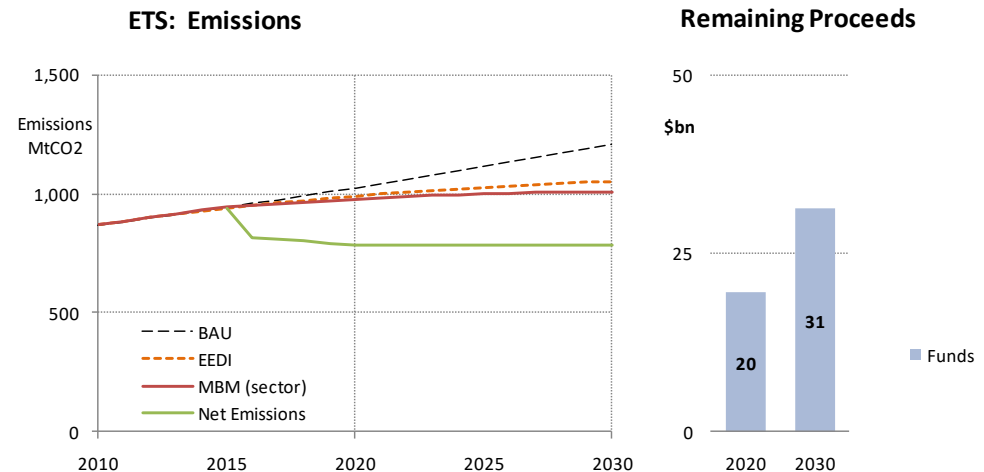
	SECT	VES	Bahamas	GHG Fund	LIS	PSL	ETS (Norway France)	ETS (UK)	RM
<b>Mandatory EEDI (Mt)</b>	123-299	123-299	123-299*						
<b>MBM In sector (Mt)</b>	106-142	14-45		1-31	32-153	29-119	27-114	27-114	29-68
<b>MBM Out of Sector (Mt)</b>				152-584			190-539	190-539	124-345
<b>Total reductions (% BAU)</b>	19-31%	13-23%	10-20%	13-40%	3-10%	2-8%	13-40%	13-40%	13-28%
<b>Potential supplementary reductions (Mt)</b>		45-454		104-143	232-919	917-1232	696-870		187-517

\* Included if the mandatory EEDI is adopted by the committee



## MODELING EFFORT

- Assumptions, assumptions, & more assumptions!
- 300-page report
- No horizontal comparison
- **No recommendation!**



# Greece's proposal

- Keep on table only Levy and ETS proposals
- Put on hold hybrid MBMs\* (US, Japan, WSC)
- Discard all others (Bahamas, Jamaica, IUCN)

- \*MBMs embedding EEDI

# Greece's proposal

- 
- Keep only ETS proposals
  - Put on hold (US, Jap., WSC)
  - Discard others (Jamaica, IUCN)

- **KEEP ALL ON THE TABLE**

# Another proposal

- Draft Resolution on Technical Co-operation and Transfer of Technology
- Brought forward by developing countries (China, India, Brazil, etc)



# Another proposal

- 
- Draft Framework on Technology Co-operation and Transfer
  - Brought forward by developing countries (China, India, Brazil, etc)
  - **NO CONSENSUS**

# Yet another proposal

- Proposal for an Impact Assessment Study on MBMs
- Brought forward by the Chairman of MEPC
- Supported by developed countries

# Yet another proposal

- 
- Proposed for an Assessment Study on MBMs
  - Brought forward by Chairman of MEPC
  - Supported by developing countries

• **NO CONSENSUS**

# MBMs

- Some proposals merged (Japan, WSC)
- Bahamas proposal reformulated and then withdrawn
- US proposal reformulated
- Basically, no real progress since 2010

# MBMs

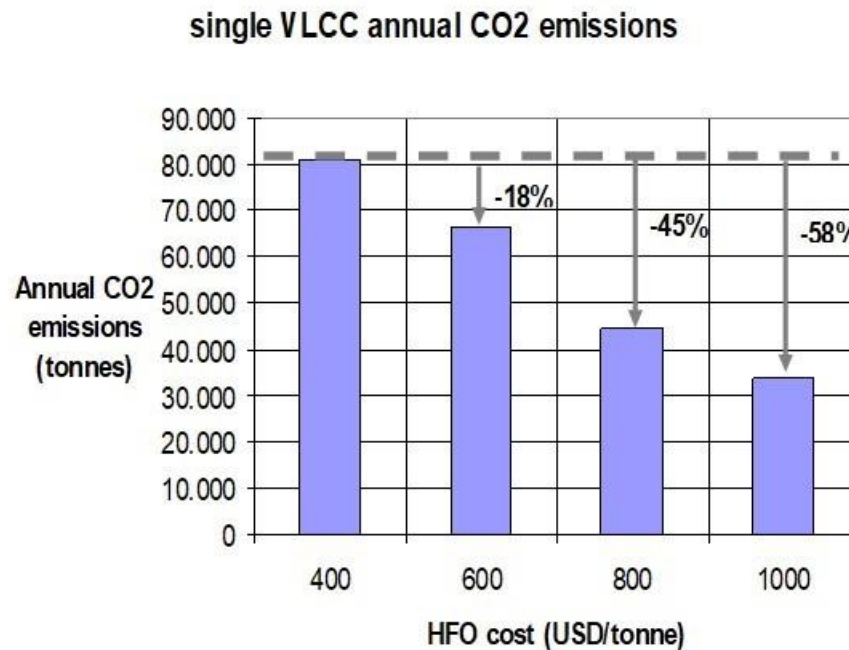
- Some proposals merged (Japan, WSC)
- Bahamas proposal reformulated and then withdrawn
- US proposal reformulated
- Basically, no real progress since 2010

MEPC 65 (May 2013):

**• MBM DISCUSSION SUSPENDED!**

# Impose a big bunker levy: THE ONLY SOLUTION

- Source: Gkonis & Psaraftis (2012)

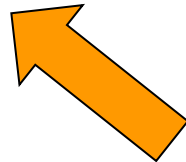




# Impose a big bunker levy: THE ONLY SOLUTION

## A levy would

- Induce slow steaming in the short run
- Provide incentives for low carbon fuels and energy saving technologies
- Implement the “polluter pays” principle
- Collect money for out-of-sector reductions (offsets)



# MBMs in the Initial IMO Strategy

- Only **obliquely** included under **medium term measures**:

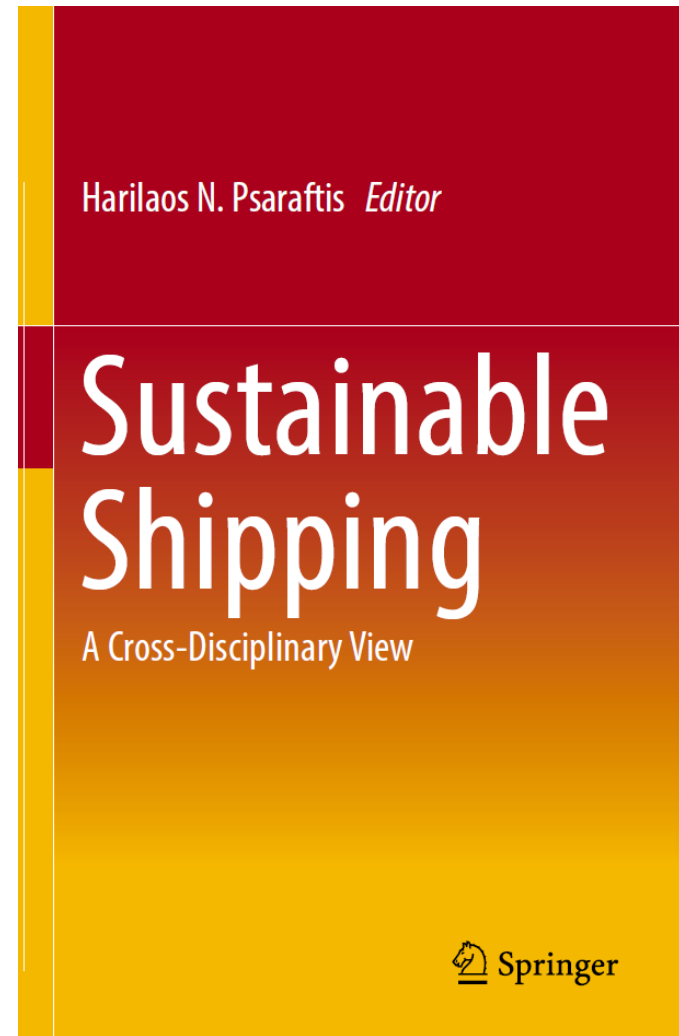
.3 new/innovative emission reduction mechanism(s), possibly including Market-based Measures (MBMs), to incentivize GHG emission reduction;

- **No much interest in MBMs right now**

# CONCLUSIONS

- The road to 2050 is a long one
- Process is rather slow, at least to identify a credible pathway
- Interest in MBMs is currently low
- Politics seems to be the main obstacle
- Need to move on soon, to have a chance reach the targets!

# Most recently



# Latest



*sustainability*



*Article*

## Speed Optimization vs Speed Reduction: the Choice between Speed Limits and a Bunker Levy

Harilaos N. Psaraftis 

DTU Management, Technical University of Denmark, 2800 Lyngby, Denmark; hnpsar@dtu.dk

Received: 18 March 2019; Accepted: 10 April 2019; Published: 15 April 2019



# THANK YOU

hnpsar@dtu.dk

